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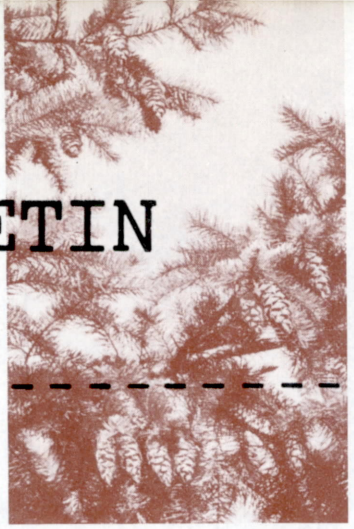

BULLETIN

from the Forestry Department

WEYERHAEUSER TIMBER COMPANY

NOTES ON BALSAM WOOLLY APHID, ADELGES PICEAE (RATZ.) AFFECTING PACIFIC SILVER FIR IN WASHINGTON*

By Julius A. Rudinsky, Forest Entomologist

A new species has to be added to the list of destructive insects on Pacific silver fir, Abies amabilis (Dougl.) Forbes, in Washington, i.e., balsam woolly aphid, Adelges piceae (Ratz.), known to affect balsam fir in eastern Canada and the eastern United States.

Adelges piceae and Adelges nüsslini Börner (another closely related species) were considered as biological races of the same species for a long time. Because of this confusion, there is some doubt about the distribution of the two species. Both species are widely distributed in Europe.

A. piceae was introduced into Nova Scotia from Europe about 1900 -probably on nursery stock. It is now established throughout the whole of Nova Scotia, Prince Edward Island, the southern half of New Brunswick, and southwestern Newfoundland; and in the United States it is established in Maine, Vermont, New Hampshire, and Massachusetts in stands of balsam fir. From the western states, it has been reported from California on Abies grandis, (Dougl.) Lind., A. pectinata, D. C., and A. nobilis (Dougl.) Lind. (Annand, 1928), and from Oregon on Abies grandis and A. lasiocarpa (Hook.) Nutt. Balch (1952), who also worked out the life cycle of this species, has reared A. piceae successfully also on Abies pectinata, A. concolor (Gord. and Glend.) Hoopes, and A. nobilis. So far as known, A. piceae has not been previously recorded on silver fir in North America. There was, until last year, no record of A. piceae affecting any species of fir in the state of Washington.

In July, 1954, heavy infestation of mature and overmature silver fir by A. piceae was discovered by the United States Department of Agriculture forest entomologists on the Gifford Pinchot National Forest and Weyerhaeuser Timber Company's St. Helens Tree Farm. From intensive aerial surveys and ground checks in

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this area, about 280,000 acres were recorded as heavily infested by A. piceae, part of it in combination with the silver fir beetle (Pseudohylesinus sp.). In 1954, similar silver fir infestations by A. piceae were found by company entomologists on other company tree farms which were: Willapa, Vail, and Skykomish in northern Washington. Other suspected areas will be checked this year. The extent of this infestation in Washington in not known. The widely separated, infested areas indicate, however, that A. piceae is well established in silver fir stands of Washington state, and there is reason to suspect that it may be spread over the entire range of silver fir.

A. piceae, apparently present in this region for a number of years, is causing extensive mortality of silver fir. Particularly, over-mature silver fir stands are deteriorating rapidly. In some localities 50 to 70 per cent or even more of the silver fir has been killed. The effects of A. piceae on the silver fir have not been studied. The external symptoms, however, appear to be similar to those described by Balch (1952) on balsam fir. Examination of felled silver firs revealed distortions and swellings of the terminal as well as smaller branches commonly referred to as "gout". In general most of the growth buds in the upper portion of the crown were killed, although in the lower portion the branches were still to some degree normal in appearance. In fewer cases, the process was reverse - the crown began to die from the bottom or from the middle portion. In stands where the infestation is well advanced, the upper parts of the crowns are dead. Gouting of the terminal and branches, dead or dying branches and branchlets, absence of new foliage, abnormal discoloration of old foliage (blackish-green to yellowish-green), and sparce density of old foliage are general characteristics of an infested silver fir, and on sunny days they can be easily observed from the ground with the help of binoculars. From a distance or from the air, the infested stand is of blackish or dark grey appearance, with many tops dead, particularly in advanced infestation.

So far, there has been no bright red discoloration observed, as often reported on balsam fir or on silver fir infested by Pseudohylesinus sp. Yellowish-red fading of needles could be observed on trees that were casting their last needles and were seriously infested by Pseudohylesinus sp. or ambrosia beetles. Ground checks are necessary to confirm aerial observations since A. Piceae infestation can be easily mistaken for Pseudohylesinus.

Occasionally the A. piceae infestation was found on the bole of silver fir in the form of dirty-white woolly encrustation concentrated mostly at the lower portion of the bole. The bole infestation was found on the younger silver firs with smooth bark, but quite rarely and in sparse concentrations on old silver firs with rough bark. No death of younger silver fir caused by bole infestation was observed.

When the silver fir are seriously weakened or dying from A. piceae, they are often attacked by the silver fir beetle, Pseudohylesinus sp. The silver fir beetle in this case is a secondary insect, making a successful attack shortly before the death of the silver fir. Old silver firs (300-350 years), younger silver firs and reproduction are affected. Younger firs do not show the crown disintegration in the same degree as old ones, though gouting and absence of new foliage can be noticed.

According to Balch (1954), winter temperatures are important in determining survival and multiplication of A. piceae on balsam fir in eastern Canada. The present area of distribution is closely related to the mean annual minimum temperature (-30°F.) in eastern Canada. As A. piceae appears to be free from parasitic insects, attempts for biological control of this species are confined to the introduction of predacious insects from Europe. Some became well established (Clark et al., 1954). It is necessary to study the effect of climatic conditions on A. piceae on silver fir, the rate of its spreading as well as the possibilities of biological control in the West.

The present fast deterioration of extensive infested silver fir stands in Washington necessitates an effective salvage program of dead or dying timber before decay reduces the present volume. In order to assist management in this program, the following steps were considered of first importance:

1. To delineate infested areas and to classify the intensity of the infestation with the purpose of assessing the logging priority. This was done by intensive aerial surveys and ground checking.

2. To determine the rate at which infested stands of different ages deteriorate. This is being studied closely on small plots with careful yearly records of appearance and condition of the crown, foliage, terminal buds and boles.

The newly detected balsam woolly aphid is established on Pacific silver fir in Washington state and according to the effects it is exhibiting on its host, it has to be registered as one of the most destructive species on Pacific silver fir.

Identification of Adelges piceae (Ratz.) was performed by Dr. R. E. Balch, Forest Biology Laboratory, Fredericton, New Brunswick, Canada.

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